

REMARKS/ARGUMENTS

Claims 1-14 are pending in this application. By this Amendment, claims 1-3 and 5 are amended. Support for the claims can be found throughout the specification, including the original claims, and the drawings. Withdrawal of the rejections in view of the above amendments and the following remarks is respectfully requested.

I. Rejection Under 35 U.S.C. §112, Second Paragraph

The Office Action rejects claims 1-5 under 35 U.S.C. §112, second paragraph as indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. It is respectfully submitted that the amendments made to claims 1-3 and 5 are responsive to the Examiner's comments, and thus the rejection of claims 1-5 under 35 U.S.C. §112, second paragraph, should be withdrawn.

II. Rejection(s) Under 35 U.S.C. §102

The Office Action rejects claims 1-14 under 35 U.S.C. §102(b) as being anticipated by Yokoyama et al., Japanese Patent No. JP 63-162129 (hereinafter "Yokoyama"). The rejection is respectfully traversed.

Independent claim 1 recites, *inter alia*, a plurality of couplings, comprising a first coupling configured to connect an end of the motor shaft to a first end portion of the ball spline unit so as to transmit the rotary force from the motor shaft to the ball spline unit, and a second coupling

configured to transmit a rotary force from the ball spline unit to the rotation shaft unit. Yokoyama neither discloses nor suggests such features, nor the claimed combination.

Yokoyama discloses a screw adjusting device which allows a screw to be rotated without applying excessive force to the screw. The screw adjusting device includes a driver bit 11 with an engagement portion 12 that mates with a head of a screw 13, and a guide cylinder 14 that surrounds the head of the screw 13. As the driver bit 11 is lowered, the screw 13 moves into the guide cylinder 14, and the engagement portion 12 of the driver bit 11 is positioned against the head of the screw 13. A pulse motor 5 rotates a shaft of the motor 5, which transmits this rotary force through elements 1 and 4 (not referred to in Yokoyama's Abstract). A force is then transmitted from elements 1 and 4 to a first end of a hollow rotating shaft 3 which has a coil spring 17 disposed therein. A second end of the hollow rotating shaft 3 is coupled to a first end of the driver bit 11 by a ball spline nut 7, ball spline shaft 8, and universal joint 10. More specifically, a second end of the hollow rotating shaft 3 is coupled to a first end of a ball spline nut 7 and shaft 8, a second end of the ball spline nut 7 and shaft 8 is coupled to a first end of the universal joint 10, and a second end of the universal joint 10 is then coupled to an end of the driver bit 11.

The Examiner asserts in Exhibit A of the Office Action that the element which joins the pulse motor 5 to the rotating shaft 3 is considered a first coupling, and the universal joint 10 is considered a second coupling. However, this element (not separately labeled in Figures 1-3 of Yokoyama, nor referred to in Yokoyama's abstract) merely transmits a force from a shaft of the

pulse motor 5 to the hollow rotating shaft 3 and coil spring 17 via elements 1 and 4. Yokoyama does not disclose or suggest that this un-numbered, un-referenced element connects an end of the motor shaft to a first end portion of the ball spline unit so as to transmit a rotary force from the shaft to the ball spline unit. Rather, a force which is generated by the pulse motor 5 must go thru what the Examiner considers a first coupling, un-referenced elements 1 and 4, and through the hollow shaft 3 prior to being transmitted to the ball spline nut 7 and shaft 8. Thus, Yokoyama does not disclose or suggest at least a first coupling as recited in independent claim 1, or the claimed combination.

Accordingly, it is respectfully submitted that independent claim 1 is not anticipated by Yokoyama, and thus the rejection of independent claim 1 under 35 U.S.C. §102(b) over Yokoyama should be withdrawn. Dependent claims 2-5 are allowable at least for the reasons discussed above with respect to independent claim 1, from which they depend, as well as for their added features.

Independent claim 6 recites, *inter alia*, a first coupling that rotationally couples the rotation unit to a first end of the ball spline unit. As set forth above, Yokoyama neither discloses nor suggests such features, nor the claimed combination. Accordingly, it is respectfully submitted that independent claim 6 is not anticipated by Yokoyama, and thus the rejection of independent claim 6 under 35 U.S.C. §102(b) over Yokoyama should be withdrawn. Dependent claims 7-14 are allowable at least for the reasons discussed above with respect to independent claim 6, from which they depend, as well as for their added features.

The Office Action rejects claims 1-14 under 35 U.S.C. §102(b) as being anticipated by Kaiser, Jr. et al., U.S. Patent No. 5,741,174 (hereinafter "Kaiser"). The rejection is respectfully traversed.

Independent claim 1 recites, *inter alia*, a plurality of couplings, comprising a first coupling configured to connect an end of the motor shaft to a first end portion of the ball spline unit so as to transmit the rotary force from the motor shaft to the ball spline unit, and a second coupling configured to transmit a rotary force from the ball spline unit to the rotation shaft unit. Kaiser neither discloses nor suggests such features, nor the claimed combination.

Kaiser discloses a grinding machine 10 including a carriage traverse assembly 30 with a carriage 38 positioned atop a base 28 on a metal bed 12, and a coupling 34 which transfers a rotational force generated by a motor 32 to a lead screw mechanism 36, which then translates that force into linear motion to move the carriage 38 along the base 28. The carriage traverse assembly 30 carries work holders 54, 56, 58, and 60 for grinding by a contouring head assembly 108.

The contouring head assembly 108 is mounted on a positioning slide 94 which moves it into position relative to the carriage traverse assembly 30 under the power of a slide feed assembly 88 (shown in Figure 2 of Kaiser, with components essentially identical to those of the carriage traverse assembly 30). The contouring head assembly 108 includes a plurality of abrasive belts and contouring feed units, and is linked to an electric motor 102 via a drive drum assembly 100. A force generated by the motor 102 turns a drive belt 104, which in turn drives the drive

drum assembly 100, causing the abrasive belts in the contouring head assembly 108 to turn.

A representative contouring feed unit 194 is shown in Figure 9 of Kaiser. The contouring feed unit 194 includes a drive motor 212 and shaft, and a roller screw mechanism 216 with an elongated shaft 218. A first end of the elongated shaft 218 is coupled to the drive motor 212 shaft with a coupling 214, and a second end of the elongated shaft 218 is coupled to a threaded shaft 222. The opposite end of the threaded shaft 222 is passed through a collar 230 and is engaged with a threaded nut 236 disposed within the collar 230. The opposite end of the collar 230 joins with a ball spline shaft 242 which passes through ball spline nuts 238 and 240. An adapter 246 with a locating lip 250 on its front face is threadably secured to a nose 244 formed at the forward end of the ball spline shaft 242 to determine a contact position with an abrasive belt.

Rotation of the drive motor 212 shaft causes the elongated shaft 218 to rotate, which, in turn, causes the threaded shaft 222 to rotate. Rotation of the threaded shaft 222 within the threaded nut 236 causes an axial movement of the collar 230, which, in turn, causes the ball spline shaft 242 to move in a longitudinal direction while the ball spline nuts 238 and 240 remain fixed. This longitudinal movement of the ball spline shaft 242 causes the nose 244 to move longitudinally until the locating lip 250 contacts the abrasive belt.

The coupling 214, which may be considered a first coupling, transmits a rotary force from the drive motor to the elongated shaft 218 and threaded shaft 222. Kaiser does not disclose or suggest a first coupling which transmits a rotary force from the motor to the ball

spline unit. Further, the collar 230, which may be considered a second coupling in Kaiser's device, translates a rotary force from the threaded shaft 222 into an axial force which is transmitted to the ball spline shaft 242. Kaiser does not disclose or suggest a second coupling which transmits a rotary force from the ball spline unit to the rotation shaft unit.

Additionally, the ball spline nut 240, which the Examiner asserts is a second coupling, serves merely as a means for guiding the longitudinal movement of the ball spline shaft 242, and is not a first or second coupling as recited in independent claim 1.

Accordingly, it is respectfully submitted that independent claim 1 is not anticipated by Kaiser, and thus the rejection of independent claim 1 under 35 U.S.C. §102(b) over Kaiser should be withdrawn. Dependent claims 2-5 are allowable at least for the reasons discussed above with respect to independent claim 1, from which they depend, as well as for their added features.

Independent claim 6 recites, *inter alia*, a first coupling that rotationally couples the rotation unit to a first end of the ball spline unit, and a second coupling that rotationally couples a second end of the ball spline unit to the rotation shaft. As set forth above, Kaiser neither discloses nor suggests such features, nor the claimed combination.

Accordingly, it is respectfully submitted that independent claim 6 is not anticipated by Kaiser, and thus the rejection of independent claim 6 under 35 U.S.C. §102(b) over Kaiser should be withdrawn. Dependent claims 7-14 are allowable at least for the reasons discussed

above with respect to independent claim 6, from which they depend, as well as for their added features.

The Office Action rejects claims 1, 5-9, and 13-14 under 35 U.S.C. §102(b) as being anticipated by Asai et al., U.S. Patent No. 6,012,222 (hereinafter "Asai"). The rejection is respectfully traversed.

Independent claim 1 recites, *inter alia*, a motor configured to generate a rotary force and to transmit the rotatory force to a motor shaft positioned along a central axis of the motor, and a plurality of couplings, comprising a first coupling configured to connect an end of the motor shaft to a first end portion of the ball spline unit so as to transmit the rotary force from the motor shaft to the ball spline unit, and a second coupling configured to transmit a rotary force from the ball spline unit to the rotation shaft unit. Asai neither discloses nor suggests such features, nor the claimed combination.

Asai discloses an electronic component mounting apparatus including a lift 28 that supports a mounting head 49, and which is powered by a z-axis motor 44 so as to move in the z-direction. A θ -axis motor 76 rotates a gear wheel 74 that causes a rotatable member 52 of the mounting head 49 to rotate about a vertical axis. The rotatable member 52 includes a stepped through hole 80, with a large diameter hole 82 into which a support shaft 84 is inserted, and a small diameter hole 86 into which a bolt 88 is inserted. A distal end of the bolt 88 is threadably engaged with a small diameter portion of the support shaft 84, thus fixing the support shaft 84 relative to the rotatable member 52.

A large diameter portion of the support shaft 84 forms a splined axis portion 118 which supports a suction device 120, including a nozzle holder 122 and a suction nozzle 124. A pair of coil springs 130 and 134 is fitted on opposite sides of the nozzle holder 122 to absorb a vertical load applied to the nozzle holder 122. The suction nozzle 124 includes a suction pipe 152 that transmits a vacuum force therethrough to absorb and hold an electronic component 178, and a cylindrical suction pipe holder 150 that supports the suction pipe 152 within the suction nozzle 124. A coupling 98, including numerous annular and radial passages, ensures that negative pressure can be supplied to a passage 94 formed in the support shaft 84, regardless of a rotational position of the rotatable member 52 so as to supply adequate vacuum force to the nozzle 124. A ball spline 126 provided in the nozzle holder 122 is engaged with the splined axis portion 118 of the support shaft 84 to allow for rotation about the support shaft 84.

It appears that the Examiner has drawn a comparison between the θ -axis motor 76 and gear wheel 74 and the motor recited in independent claim 1. However, the rotary force generated by the motor 76 and transmitted by the gear 74 is transmitted to the rotatable member 52, and not to a motor shaft positioned along a central axis of the motor, as recited in independent claim 1.

Further, it appears the Examiner has drawn a comparison between the bolt 88 and the first coupling recited in independent claim 1. However, the bolt merely fixes the support shaft 84 in place relative to the rotatable member 52, and the rotary force generated by the θ -axis motor 76 is transmitted to the support shaft 84 through the interaction of the gear wheel 74 with

the rotatable member 52. Thus, Asai neither discloses nor suggests a first coupling as recited in independent claim 1.

For at least these reasons, it is respectfully submitted that independent claim 1 is not anticipated by Asai, and thus the rejection of independent claim 1 under 35 U.S.C. §102(b) over Asai should be withdrawn. Dependent claim 5 is allowable at least for the reasons discussed above with respect to independent claim 1, from which it depends, as well as for its added features.

Independent claim 6 recites, *inter alia*, a first coupling that couples the rotation unit to a first end of the ball spline unit, and a second coupling that rotationally couples a second end of the ball spline unit to the rotation shaft. As set forth above, Asai neither discloses nor suggests such features, nor the claimed combination. Accordingly, it is respectfully submitted that independent claim 6 is not anticipated by Asai, and thus the rejection of independent claim 6 under 35 U.S.C. §102(b) over Asai should be withdrawn. Dependent claims 7-9 and 13-14 are allowable at least for the reasons discussed above with respect to independent claim 6, from which they depend, as well as for their added features.

III. Conclusion

In view of the foregoing amendments and remarks, it is respectfully submitted that the application is in condition for allowance. If the Examiner believes that any additional changes would place the application in better condition for allowance, the Examiner is invited to contact

Serial No. 10/020,937

Docket No. MRE-0047

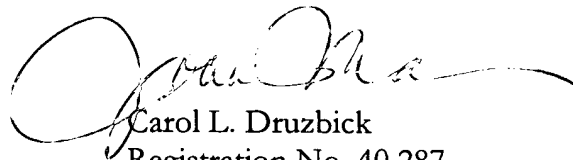
Amdt. Dated February 17, 2005

Reply to Office Action of November 29, 2004

the undersigned attorney, Carol L. Druzbeck, at the telephone number listed below. Favorable consideration and prompt allowance are earnestly solicited.

To the extent necessary, a petition for an extension of time under 37 C.F.R. 1.136 is hereby made. Please charge any shortage in fees due in connection with the filing of this, concurrent and future replies, including extension of time fees, to Deposit Account 16-0607 and please credit any excess fees to such deposit account.

Respectfully submitted,
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Date: February 17, 2005

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